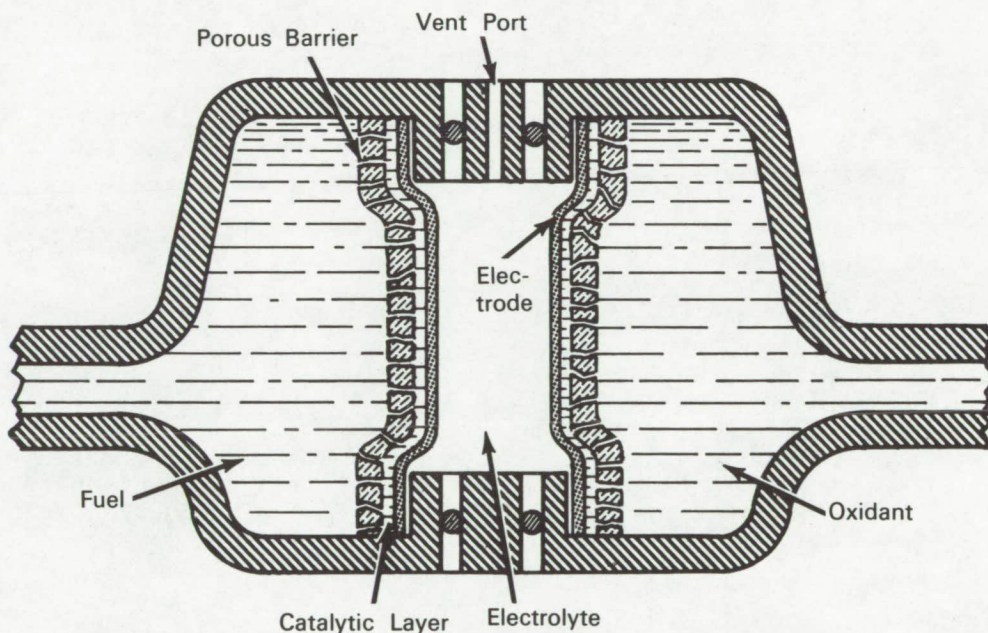


# NASA TECH BRIEF



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## Vapor Diffusion Electrode Improves Fuel Cell Operation



### The problem:

To design a fuel cell electrode that will effect mixing of the feedstock with the electrolyte at the electrolyte/catalyst interface but prevent decomposition of the feedstock and poisoning of the catalyst by liquid mingling.

### The solution:

A vapor diffusion type electrode that presents a nonwetting barrier to the liquid feedstocks so that they may contact the electrolyte only in the vapor state.

### How it's done:

Control of feedstock flow is identical for both fuel and oxidant; however, only the fuel is discussed here. The fuel contacts the nonwetting porous barrier that prevents its passage in the liquid state but permits it to pass through as a vapor. As the fuel reaches the electrolyte/catalyst interface, it mixes with and dissolves in the electrolyte, thus retaining the desirable effect of simultaneous triple contact of catalytic electrode, fuel, and electrolyte. At the outside face of the porous barrier, the bulk of the fuel remains in the liquid state, an

(continued overleaf)

advantage in handling as compared to gaseous fuel requirements of heavy pressure containers.

**Notes:**

1. Highly fluorinated polymers with approximately 10 to 15 micron pores have been found satisfactory for use with standard feedstocks and electrolyte.
2. For rapid transmission of feedstock to the catalytic electrode surface, barrier thickness should be as small as is consistent with retention of its non-wetting ability.

**Patent status:**

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act (42 U.S.C. 2457 (f)) to the Monsanto Research Corporation, 800 North Lindbergh Boulevard, St. Louis, Missouri 63166.

Source: John O. Smith  
of Monsanto Research Corporation  
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